Concordia University
Dept. of Computer Science & Software Engineering

Comp 353 - Databases
Summer 2023

Warm-up Project

Title: A Simple database for the education health facilities
Due: July 23, 2023 at 23:55
Maximum Mark: 6%

In this project, you and your group are required to develop a miniature database application system, described below, and evaluate a number of queries and transactions against the database. For this, you should use the faculty MySQL DBMS through the ID assigned to your group, which is a string of the form "xyz353_1" for some letters x, y and z. The Lab Instructors during the lab sessions will help you resolve possible problems you may have, for instance, connecting or interacting with the DB server.

Project Description

The application is to develop a database system to help the ministry of education to keep track of all the personnel's health status during the COVID-19 pandemic. The system should maintain all the information that is related to the pandemic about the employees of the ministry and the students who are getting education within the ministry.

Information includes infection(s) of every person, date of infection and nature of infection. The person could be infected more than once. Every time a person is infected, the application needs to store the date of the infection, and the type of infection. The infection type could be COVID-19, SARS-Cov-2 Variant, or other types of infection.

Also, information about the vaccination of every person including for every vaccination, the vaccination date, the type of vaccination, and the dose number of the vaccination. The type of vaccinations could be Pfizer, Moderna, AstraZeneca, Johnson & Johnson, etc. Also, the dose number could be 1, 2, or more. For example: Alfred McDonald could have taken the first vaccination dose Pfizer on the 20th of January 2021, and the second vaccination dose Moderna on the 25th of April 2022.

The information maintained by the system is used to help the ministry to keep track of their employees and their students' health status to reduce the risk of contamination between the people within the ministry's different facilities. The system is called Education Personnel Status Tracking System EPSTS.

Each ministry operates different facilities. Each facility could include name, address, city, province, postal-code, phone number, web address, capacity (Maximum number of employees that the facility needs to operate). A facility could be a management facility or could be an educational facility.

A management facility could be a head office facility or a general management facility. A management facility could be operated by different employees. Each management facility has one president, many secretaries, many specialized personnels, and many other employees such as security personnel, or any other personnel working for the facility. Each ministry has only one head office facility. The president of the head office is the minister of education of the ministry. An educational facility could be a primary school, a middle school, a high school, or a combination of any of the three schools. An educational facility could be operated by different employees and have many students. Each educational facility has one principle and many employees.

The application must maintain information about every employee working in each facility and every student registered in each educational facility. The information includes first-name, last-name, date of birth, Medicare card number, Medicare expiry date, telephone-number, address, city, province, postal-code, citizenship, and email address.

An employee could be a teacher, administrative personnel, or any other personnel working for the facility. A teacher could be an elementary teacher, or a secondary teacher. A secondary teacher can be specialized in one subject and can work as school counselor, program director, and school administrator.

Every employee and every student must be registered with the public health care system which means that the Medicare card number cannot have null value. No two people can have the same Medicare card number.

An employee can work at only one facility at the same time. An employee can work at different facilities at different times. For every employee, the start date and end date working at each facility must be maintained. If the end date is null, it indicates that the employee is still working at the facility. An employee can work at the same facility at different intervals of times. For example, Roger Smith who is a teacher could have worked at Rosemont Elementary School from Jan 15th, 2022, to September 15th, 2022, then worked at Laval Secondary School from September 16th 2022 to February 15th 2023 and then worked at Rosemont Elementary School from February 16th 2023 till now.

A student can be registered at only one educational facility at the same time. A student can be registered at different educational facilities at different times. For every student, the start date and end date registered at each facility must be maintained. If the end date is null, it indicates that the student is still registered at the facility. The current level of every student must be maintained by the system. For example, a student is currently in elementary 3 or in secondary 2, etc.

These are the minimum requirements for the application. More details could be added through more research and investigations on your part.

1. Express the Education Personnel Status Tracking System EPSTS in the E/R model. Use arrows to indicate the constraints on the relationships. Underline the key attributes for the entity and relationship sets.

2. Convert the E/R diagram into at least four relations: Ministries, Facilities, Employees, Students, Vaccines, and Infections. Other relations might be needed to capture all the requirements.

3. Write SQL scripts to create the Health Facility Employee Status Tracking System database and populate the tables with appropriate data. Also write SQL scripts of the queries and transactions given below. Include at least ten representative tuples in each table so that the result of each query includes at least two tuples. Note that the Graphical User-Interface (GUI) is not required in this project but encouraged.

    i. For every ministry in the system, get the province name where the ministry is located, the name of the minister of education in the ministry, the number of facilities within the ministry, the total number of employees currently working for all the facilities in the ministry, and the total number of students currently registered in the schools within the ministry. The results should be displayed in deccending order by total number of facilities.

    ii. For every educational facility in the city of Montréal, find the facility name, the total number of teachers currently working, the total number of students currently registered, the total number of teachers who got infected by COVID-19, the total number of students who got infected by COVID-19, the total number of teachers who got vaccinated by at least one dose, and the total number of students who got vaccinated by at least one dose. Results should be displayed in ascending order by facility name.

    iii. For the Rosemont elementary school, give a report of all the students who got infected by COVID-19 and have their Medicare card expired. The report should include the student's first-name, last-name, date of birth, Medicare card number, Medicare expiry date, telephone-number, and email address. The results should be displayed in ascending order by Medicare expiry date.

    iv. For all the students who are currently registered in an educational facility in the city of Laval and who got infected at least twice with any type of infection within the last two weeks, give the student's first-name, last-name, date of birth, infection type, date of infection, telephone-number, and email address. The results should be displayed in ascending order by first-name, then by last-name, then by infection date.

v. Give a report of all employees who got infected at least one infection by COVID-19 and have never been vaccinated. The report should include the ministry where the employee works, the facility name, and the city where the employee is currently working, the first name, last name, and email address of the employee. Results should be displayed in ascending order by ministry name, then by city name, then by facility name.

vi. Give a report of all the educational facilities that none of their employees ever been infected by COVID-19 and none of their students ever been infected by COVID-19. The report should include the facility name, the ministry that the facility belongs to, the city where the facility is located, and the name of the principle of the facility. Results should be displayed in ascending order by ministry name, then by city, then by facility name.

vii. For every vaccine type, give the total number of doses taken by students in the system. Display results sorted in descending order by total number of doses.

viii. For every infection type in the system, give the total number of students infected by that type in each ministry. Results should be displayed sorted in ascending order by infection type, then in descending order by total number of infections

Note: You can use multiple queries to answer any of the eight transaction queries above if necessary.

Project Report: Structure and Contents

Each group should submit their project report through Moodle before the deadline, one report per group. Please check the course Moodle for more information and download the "expectation of originality". The report should include the following parts:

(1) DESIGN: The E/R diagram of the design of the database given in the project description (or a revised version, if deemed necessary).
(2) The SQL statements that are formulated and used to create the database. Pick appropriate data types for the attributes, the identifying key attribute(s), the relationship among the tables and include them in your report.
(3) The SQL statements that are formulated to express the required queries and transactions mentioned.
(4) Populate each table in the database with at least ten representative and appropriate tuples.
(5) For each relation **R** created in your database, report the result of the following SQL statement:

SELECT COUNT(*) FROM R;

A Final Note: Your report should also include the originality FORM as the cover page that is signed by EVERY member of the group. The cover page should also include the name and ID of every member of the group members together with the "Group Account" assigned by Stan's email confirmation of your group registration.